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# A PHYSICAL FITNESS TRAIL
# FOR THE
# VISUALLY IMPAIRED

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Theoretical Aspects of Motoric Education
for Exceptional Children

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This is a theoretical plan of a physical fitness trail for the blind. The evidence indicates that the blind have a definite need for a program of physical fitness. This report will use the terms blind and visually impaired interchangeably. A person who is blind is visually impaired and a person who is visually impaired has a degree of blindness. The trail is designed basically for school age children so that they may gain confidence and develop skills at an early age. The trail can be used by anyone if equipped properly. The physical fitness trail can greatly improve physiological fitness plus have many side benefits of psychological fitness.

The visually impaired have had good leadership in physical education from the very beginning. One out of three schools for the visually impaired that was in existence in 1830-1833, The Perkins Institute in Boston, made provisions for the students to receive physical education. The director of the school, Dr. Samuel Gridley Howe, was a strong advocate of health and physical education. Dr. Charles Buell, who is blind and holds a doctoral degree in physical education, is also an avid proponent of physical education for the blind.

In the 1900's, team sports started to develop and there was even competition in wrestling with sighted opponents. By 1920 there was the first nursery for blind infants. Educators begain to realize the importance of early childhood intervention. The three main objectives in physical education are vigorous exercise; yet modified physical education and sports programs, directed movement in spatial concepts, and early intervention.(1)

Before 1948, about all the visually impaired children were educated in residential schools. Visually impaired now attend special adapted physical education classes in normal schools and more recently a few have classes with the sighted. It is estimated that one to two children in 1,000 require special education because of a visual handicap. Approximately 30,000 impaired children attend local and residental schools for visually handicapped. "A substantial increase in the total number of visually impaired children

in public schools, increased form 5,818 in 1949 to 30,587 in 1977." (2)

According to the pamphlet, *Facts About Blindness and Visual Impairment*, issued by the American Foundation for the Blind, Inc., there are 1.4 million people in the United States who are severly visually impaired. Over 70% are over the age of 65, and approximately 37,000 are under the age of 18. Of all school age children, .2% are partially sighted and .04% are legally blind.

For general education purposes the blind must use braille for reading. The partially sighted can use vision but they need aids, i.e., large print. The two main classifications for teaching strategies are congenitally and adventitiously blind. The congenitally blind student was born blind and the adventitiously blind was formerly sighted but lost vision.(3) As of this year in New York State, The Committee on the Handicapped decides if a visually impaired student will receive services.

The classification for the visually impaired are legally blind and partially sighted. The legally blind have 20/200 vision or worse in the better eye after correction. 20/200 is the ability to see at 20' what the normal eye can see at 200'. Also, legally blind are those with tunnel vision, which is ≤ 20° visual field restriction. Tunnel vision is seeing only with part of the retina. The partially sighted have 20/70 to 20/200 vision in the better eye after correction.(4)

Further specific classifications are travel vision, motion perception, light perception, and the lack of visual perception. Travel vision (5/200 to 10/200) is the ability to see at 5' to 10' what persons with normal vision see at 200'. Motion perception (3/200 to 5/200) is the ability limited entirely to seeing motion. Light perception is less than 3/200, is the ability to see a strong light at 3'. Lack of visual perception, total blindness, is the inability to recognize a strong light which is shown directly into the eye. Seventy-five percent of legally blind persons have some usuable vision, residual vision.(5)

The cause of 40% of visual impairment in 1940-1965 was due to retrolental fibroplasia, which is an excessive amount of oxygen in the incubator of a premature child. In the 1960's, rubella was the main cause but it is unlikely to recur due to vaccine. Glaucoma, which is an increase of the amount of pressure within the eye on the optic nerve affects about 2% of adults.(6) The leading new cause is diabetic retinopathy which is the rupture of blood vessels which forms scar tissue that pulls the eye away from the surface of the retina.(7) Another major cause is accidents. Other causes are infections, tumors and heredity.

Most kinds of visual defects are errors in refraction. Hyperopia, farsightedness, is the rays of light focusing behind the retina. Myopia, nearsightedness, is the rays of light focusing in front of the retina. Astigmatism is an irregularity in the

curvature of the cornea or lens making the light refract unevenly.(8) Another defect is that of muscle dysfunction. Strabismus, crossed eyes, is caused by the lack of coordination of external eye muscles. Heterophoria is an insufficient action of eye muscle making the eye deviate from normal position causing binocular vision. Nystagmus is the quick, jerky movements of the eyeball.

Other anomalies are, albinism, which is hereditary, is the lack of color in the iris which allows too much light to reach the retina; monocular vision, in one eyed persons, is the absence of depth perception. Cataracts cause the lens to change to a cloudy or opaque appearance so that one cannot see clearly through it.(10)

The motoric characteristics of the blind (called blindisms or manneristic behaviors) are believed to be caused by their innate need to move. Common blindisms are rocking backward and forward, eye rubbing or pushing on the eyes with the fingers or fist, waving the fingers in front of the face, whirling around and around, bending the head forward and poor posture. All of the above can be prevented or minimized by providing vigorous daily activity and meaningful tasks to do. (11)

According to Claudine Sherrill, there are many physical characterists of the blind for physical eduation.
Included are:

1. Posture is poor due to the lack of a visual model. The head is the main problem.

2. Physical growth is slowed down due to inadequate movement.

3. Overweightness is due to the sedentary lifestyle.

4. "Physical fitness is affected by lack of vigorous exercise. When running and throwing activities are used as measures of fitness, the blind child is at a particular disadvantage. He tends to be equal to sighted in such events as pull ups, push ups, sit ups, arm hang, and standing long jump."(12)

5. Fatigue easily because of lack of fitness.

6. The face of the blind person may become mobile and expressionless.

There are many definitions of physical fitness. According to David R. Lamb, physical fitness is the "the capacity to meet the present and potential physical challenges of life with success."(13) The President's Council on Physical Fitness and Sport defined physical fitness as "the ability to carry out daily tasks with vigor and alertness without undue fatigue, and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies." (14) Many students do not understand physical fitness. Many ask the question, "fitness for what?" The answer is simple: "sufficient fitness for performing daily tasks without undue fatigue at the day's end."(15) There are too many sighted and unsighted that are totally exhausted after a normal day at school because of the state of their physical fitness.

Total fitness has four main components.(16)

1. Psychological fitness
    a) to achieve emotional stability within your envior̬nment
    b) to handle emergency emotional problems
2. Health, or normal physiological function
3. Body mechanics of performing everyday skills
4. Physical anthropometry - good muscle tone

The factors of physical fitness are: muscular strength, muscular endurance, muscular power, muscular flexibility, cardiovascular fitness, and neuromuscular coordination. Muscular strength is "the force that a muscle or group of muscles can exert against a resistance in one maximum effort." (17) Muscular

endurance is "the ability of a muscle to work against a moderate resistance for long periods of time." (18) Muscular endurance is continuous repetitious use of contracting and relaxing a muscle. Muscular power is getting your "body mass moving in the shortest period of time."(19) Muscular flexibility is the "range of motion at a particular joint, measured in degrees."(20) Cardiovascular or cardiorespiratory fitness is the ability to work at a moderate intensity over a continuous amount of time. This is an aerobic (with oxygen) activity which gives a good indication of physical fitness. "The main objective of an aerobic exercise program, therefore, is to increase the body's capacity to process $O_2$, i.e., to deliver it to the tissue cells where it is united with food for the production of energy."(21) Neuromuscular coordination is the ability of a person to move his body in a muscular way. (22)

A physical fitness trail allows for early intervention to help improve motoric and other physical characteristics. It will also help reduce anxiety, fatigue and the hypokinetic syndrome. improve cardiovascular endurance, as well as improve performance on the physical fitness test of the visually impaired.

The time to start a fitness program is as soon as possible. According to Cratty, much of the physical behavior of sighted infants is instigated by their ability to see objects or people. Therefore, it is reasonable to assume that the physical development of blind infants is behind sighted infants. "Blind infants do not reach out with their hands because they "see" no reason to do so." (23)

Fraiberg's research indicates that many children do not receive intervention before school age (4 to 6 years old) so they may "lack vigorous exploratory behavior manifested in the upper limbs and be reluctant to manifest expansive locomotive behavior." (24)

Evidence indicates that, with vigorous activity, many of the blindisms can be minimized. Also, there are many of Sherrill's physical characteristcs, especially the ones that have been listed, that could be improved upon by a physical fitness trail.

Stamford (1975) theorized that blind people who were not

physically fit would experience more stress then those who were fit.(25) Having a fitness trail for regular exercise may reduce stress.

The expenditure of energy of a blind individual is much greater then a sighted individual.

> "Blindness is associated with a reduced mechanical efficiency that increases the energy cost of all movement, particularly locomotion (Buell, 1974; Stamford, 1975). Futhermore, the increased residual tension developed when motor tasks must be performed without feedback increases the metabolic demands on circulatory. respiratory and neuromuscular systems (Buell, 1973). Consequently, the visually impaired expend more energy than their sighted peers to accomplish a given task and become fatigued more rapidly." (26)

Fatigue is related to the body's aerobic capacity, and may be improved by a program of regular exercise. Hypertonia, a condition suffered by the blind which causes them to become tired and slump, is caused by fatigue. It is important that the blind exercise regularly in order that they maintain sufficient aerobic capacity to perform daily tasks without undue fatigue. (27)

The lack of exercise not only creates fatigue but also causes "hypokinetic disease syndrome (Kraus and Raab, 1961) that includes obesity, hypertension, diabetes mellitus, arteriosclerosis, osteoporosis, increased cardiac risk, and a reduced life expectancy (Stamford, 1975)."(28)

Buell estimates that about one-third of the blind receive

physical education and, those programs are of questionable value. (29) In addition, a great deal of overprotectiveness by parents and schools exacerbates this problem, and leads to "creeping overweightness".

DeVries' 1980 study showed that the blind do not have an age-predicted normal heart rate during exercise, indicating low muscular endurance. Many of the subjects stopped exercising due to muscular fatigue. There was also indications of respiratory muscle weakness.(30) All of the studies indicate that these weaknesses are due to the lack of regular exercise. "Evidence shows that regular exercises, and especially cardiovascular conditioning is a contributing factor toward better mental and physical health."(31)

Cardiovascular exercise is the most avoided due to the blind's inability to participate. Because of this, there is a risk factor contributing to coronary heart disease, and, there is some evidence that cardiovascular training may reduce chronic anxiety. Positive results of cardiovascular exercise include the increase of coronary vascularization, improvement of myocardial function, a decreased level of cholesterol and serum triglycerides and the reduction of obesity.(32)

Research indicates that the blind or visually impaired prove to be generally inferior in many tasks involving motor performance in relation to the sighted. The blind are relatively equal in strength and endurance exercises in which there is not complex coordination

skills required, i.e., such exercises as sit ups, pull ups, and push ups. But in skills such as running and throwing, they are inferior. Reasons for their inferiority could be due to lack of experience, lack of incentive lack of a model or a neurological problem.(33)

Besides making the body physiologically fit, the fitness trail would have many beneficial effects for the blind. The reduction of tension, the improvement of posture due to a better self-image, improving self-confidence, fostering independence, successfully being able to cope with the challenges of a sport, and, the opportunity of socializing with exercisers, both blind and sighted.

It is important that the incentive to use the fitness trail come from the blind themselves. They should not be forced to use the trail.

There are many ways to set up the fitness trail. Much of the planning depends on needs, facilities and budgets. I am attempting to set up the ideal fitness trail, assuming unlimited amount of money and facilities. This trail could be used by both unsighted and sighted school age individuals, with some explanation and guidance. The trail's main objective is to develop total physical fitness when used at least three times per week.

Before the blind individual uses the trail, it is suggested that the following instruction be used in sequence.

1. Teach all station exercises in the order that they will be encountered.

2. Provide verbal description of the trail that they will encounter using a visual and tactile map of the course.

    a) Straight aways - are hard packed dirt.

    b) The two turns are slight inclines of a semi-soft sand.

    c) Guide wires are all on the right side of the trail. There are three different heights to accommodate the height of individuals.

    d) Differences in wire thickness indicate distance from stations.

    e) At each station is a bright red flag.

    f) The exercise area is a slightly sunken wooded platform to the right of the guide wire, and is enclosed by wooden hand rails.

g) On the platform, a tape recorded message tells what to do. A photo-electric sensor automatically activates the tape machine and rewinds itself.

1. If your budget does not allow for tape recorders, or in case of failure of a machine, braille and large print signs can be made up. It is a good idea to have print so that sighted people can also use the trail, fostering socialization.

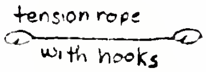
h) Follow the handrail around the platform to a yellow flag and the guide wire. It is fifty yards between stations.

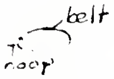
i) Between station number thirteen and fourteen, it is one hundred yards. Run as fast as possible for fifty yards. When the guide wire gets bumpy and there is a yellow flag, slow down, then walk, there is a red flag at the fourteenth station.

3. Walk through the trail many times.

4. Walk through the trail and do the exercises. Do as many exercises as possible, or until reaching the specified amounts.

5. Walk through the trail with the tension rope attached to the guide wire. The tension rope is slightly elastic with a hook at each end. The students wear a belt with a loop on the side. Hook one hook through the loop and the other on the guide wire. Find the correct height for you at your waist. Walk through the trail and feel the difference of the guide wire when you near a station. Practice hooking up and unhooking.





6. Jog slowly through the trail and feel the guide wire but, also use your arms to pump.

7. As soon as you are comfortably with the trail, try it on your own.

8. Different ways of using the trail.

a) Long cane technique with a sighted partner. (34)

b) Use of a sighted guide, just touching elbows and lower arms to keep the same rhythm and stride. (35)

9. Use of cards to mark success at each station and keep track of progress.

The exerices for the fitness trail #1-#14. Jog at a comfortable pace between the stations. The trail is six hundred yards long; according to the President's Physical Fitness Test, is an accurate indication of cardiovascular endurance.

Station #1 Neck Circles

Tilt head forward, then to the right, then backward, then to the left, forward; right, back, left, forward.

Now left, back, right, forward; left, back, right, forward.

Follow the handrail to the left to the guide wire and hook up; jog to station number two.

Station #2 Arm Swings

Extend both arms straight overhead then swing them forward, down and back.

Repeat exercise ten times.

Follow the handrail to the left to the guide wire and hook up; jog to station number three.

Station #3 Side Bends

Put hands on hips, now tilt the upper body to the right then to the left. Notice that in the tilt position, the elbow points to the ground.

Repeat twenty times, ten to the right and ten to the left.

Follow the handrail to the left to the guide wire and hook up; jog to station number four.

Station #4 Toe Touches

Feet are shoulder width apart and knees are slightly bent; bend over and touch toes and return to standing position.

Repeat exercise ten times.

Follow the handrail to the left to the guide wire and hook up; jog to station number five.

Station #5 Log Hops

Follow the handrail around until the hand touches a bump on the rail or the foot touches the log. Now jump over the log to the left and back again to the right.

Beginners repeat exercise five times.

Advanced repeat exercise ten times.

Follow the handrail to the left to the guide wire and hook up; jog to station number six.

## Station #6 Bar Swing

Follow the handrail around until the hand touches an upright bar. To the left is a cross bar which is a low bar, further to the left is a medium height bar and next a high bar. Find the bar that is easiest to hang from with the hands. In the hanging position, lift legs up in front. Try to hold the position for three seconds.

Beginners repeat exercise five times.

Advanced repeat exercise ten times.

Now return to the right, to the low bar, go under it and follow the handrail to the left to the guide wire and hook up; jog to station number seven.

## Station #7 Sit Ups

Follow the handrail around until the hand touches a bump on the rail or the foot touches the log. The log is slightly raised, step over the log. Lie on back and hook feet under the log. Slide buttocks up to the log until legs are slightly bent. Sit up and touch hands to knees. If this is too easy, clasp hands together and put them behind head. Bend forward and touch elbows to knees.

Beginners repeat exercise five times.

Advanced repeat exercise ten times.

Follow the handrail to the left to the guide wire and hook up; jog to station number eight.

## Station #8 Pull Ups

Follow the handrail around until the hand touches an upright bar. To the left is a cross bar which is a low bar, further to the left is a medium height bar and next a high bar. Find the bar that is easiest to hang from with the hands. Grasp the bar with the palms facing away from the body, now try to lift the body up, so that the chin goes above the bar, then return to starting position.

Beginners repeat exercise two times.

Advanced repeat exercise six times.

Now return to the right to the low bar, go under it and follow the handrail to the left to the guide wire and hook up; jog to station number nine.

## Station #9 Log Lifts

Follow the handrail around until the hand touches a loop with a rope attached. At the end of the rope is a light weight log, with handles sticking out from the sides. With legs apart and bent, grasp the handles and lift the log up. Stand up, then lift the log over the head, then back down to the ground. Make sure to bend the legs.

If this log is too light then follow the rope back to the handrail and move to the left to the next loop with a rope attached. At the end of the rope is a medium weight log.

Repeat exercise ten times.

Follow the handrail to the left to the guide wire and hook up;

jog to station number ten.

## Station #10 Step Ups

Follow the handrail around until the hand touches a bump on the rail or the foot touches the first step, which is very low. Go around this step and there is a step of medium height, then another that is high. There is another handrail to the left so it is easy to go around the steps. Find the step that makes the upper leg parallel to the ground. Step up with the left leg, then up with the right leg; then down with the right leg then down with the left leg.

Beginners repeat exercise five times.

Advanced repeat exercise ten times.

Follow the handrail to the left to the guide wire and hook up; jog to station number eleven.

## Station #11 Push Ups

Follow the handrail around until the hand touches a bump on the rail or the foot touches the log, step over the log. Place the feet over the log, so that the toes point down. Place palms on the ground, the body is straight and the arms are straight. Now lower the chin to the ground bending the arms and keeping the body straight. Then push the body back up until the arms are straight again.

Beginners repeat exercise five times

Advanced repeat exercise ten times.

Follow the handrail to the left to the guide wire and hook up; jog to station number twelve.

## Station #12 Leg Stretches-Sitting

Sit down on the platform with legs together, straight out in front. Point toes away from you. Reach out as far as possible with hands toward toes. Do not let legs bend, hold for three seconds.

Beginners repeat exercise five times.

Advanced repeat exercise ten times.

Follow the handrail to the left to the guide wire and hook up; jog to station number thirteen.

## Station #13 Arm Circles

In a standing position with arms extended to sides so that they are parallel to the ground. Move the arms in small circles forward ten times then backward ten times. Move them in big circles forward ten times and backward ten times.

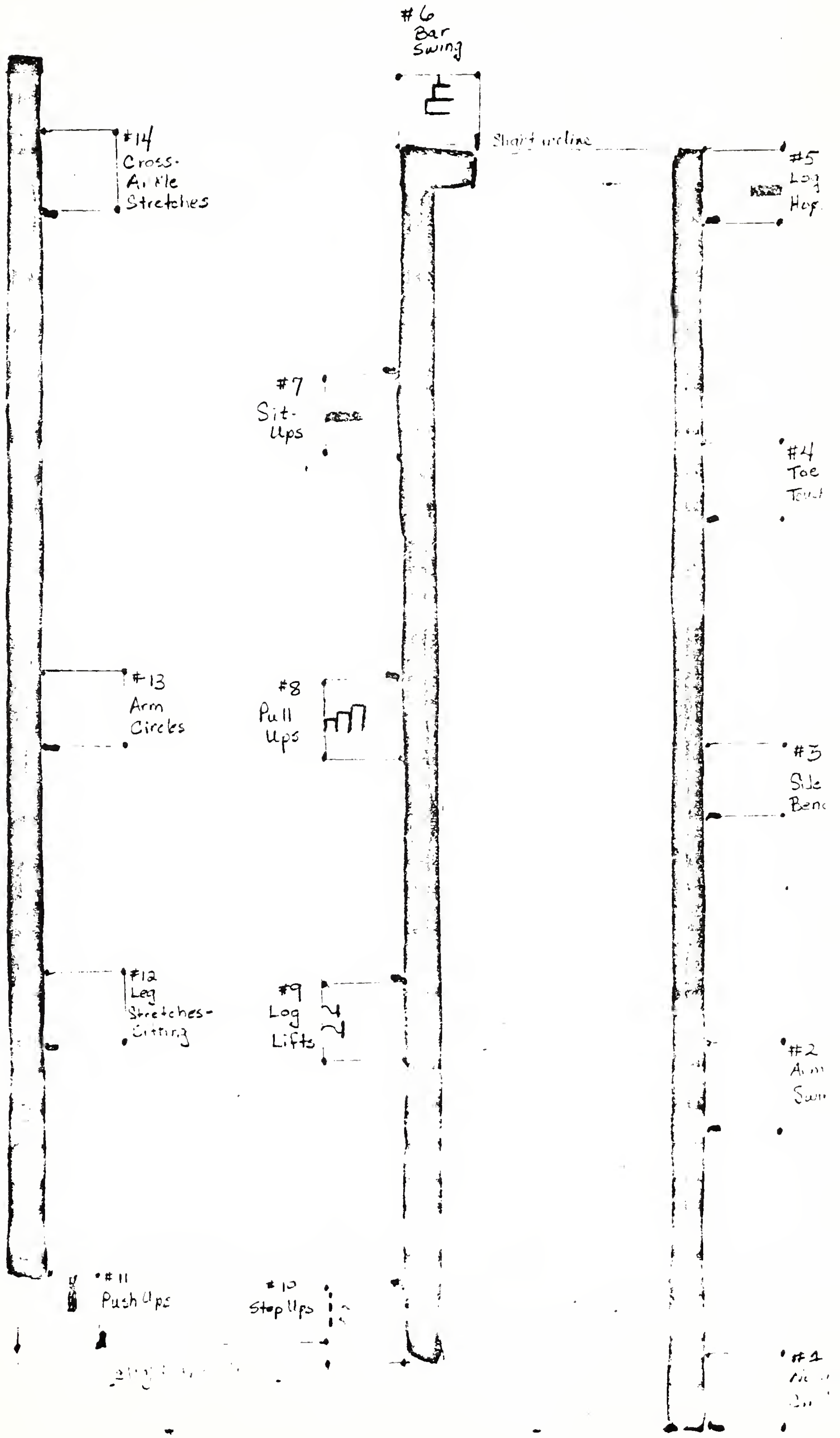
Follow the handrail to the left to the guide wire and hook up. Run as fast as possible until the texture of the guide wire is bumpy, or you see the yellow flag, then jog until the guide wire is smooth, then walk. When the guide wire slows down or you see the red flag, like before coming to a station, you are now at station number fourteen.

### Station #14 Cross - Ankle Leg Stretch

In the standing position cross the right ankle over the left. Bend down toward the toes, as far as possible, keeping the legs straight. Hold for the count of six and repeat four times. Next cross the left ankle over the right and hold for the count of six and repeat four times.

Congratulations on having finished the fitness trail. Come back again real soon.

Platform- 1/2" = 6 yds



The fitness trail is a multidisciplined activity. Jogging between stations improves the cardiovascular system, and heart rate can be monitored. The President's Physical Fitness Test, can be used as a pre and post test on an annual basis to monitor improvement. Indirectly, psychological behavior will likely improve.

The fitness trail is designed to help the blind interact with the sighted in an activity beneficial to both.

## FOOTNOTES

1. Bryant J. Cratty, *Adapted Physical Education for Handicapped Children and Youth*, p. 10.

2. Samuel A. Kirk and James J. Gallagher, *Educating Exceptional Children*, p. 257.

3. Dava Grayson, *Facts About Blindness and Visual Impairment*, p. 3.

4. Kirk, *op. cit.*, p. 238.

5. Claudine Sherrill, *Adapted Physical Education and Recreation*, pp. 330-331.

6. Kirk, *op. cit.*, pp. 242-243.

7. Grayson, *op. cit.*, p.3.

8. Kirk, *op. cit.*, p. 241.

9. *Ibid.*

10. *Ibid.*

11. Sherrill, *op. cit.*, p. 339.

12. *Ibid.*, p. 340.

13. David R. Lamb, *Physiology of Exercise*, p. 6.

14. Philip J. Rasch and Roger K. Burke, *Kinesiology and Applied Anatomy*, quoted from the President's Council on Physical Fitness and Sport, pp. 350-351.

15. Donald K. Mathews, *Measurement in Physical Education*, p.7.

16. *Ibid.*, pp.4-5.

17. *Ibid.*, p. 5.

18. *Ibid.*, pp.5-6.

19. *Ibid.*, p.6.

20. *Ibid.*

21. Sheila Laughlin, "A Walking-Jogging Program for Blind Persons," *New Outlook for the Blind*, September 1975, p. 312.

22. Mathews, op. cit., p.6.

23. Cratty, op. cit., p. 111.

24. Ibid., p. 112.

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26. L. W. Jankowski and J. K. Evans, " The Exercise Capacity of Blind Children," Journal of Visual Impairment and Blindness, June 1981, p. 248.

27. Ibid.

28. Ibid.

29. Ibid.

30. Ibid., p. 251.

31. Laughlin, op. cit., p. 313.

32. Stamford, op. cit., pp. 309-310.

33. Cratty, op. cit., p. 119.

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